REMARKS

The Office Action dated February 8, 2006, has been received and carefully noted. The following remarks are submitted as a full and complete response thereto. Claims 1-62 are currently pending in the application, of which claims 1, 25, and 44 are independent claims. Claims 1-62 are respectfully submitted for consideration.

Claims 1-62 were rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,735,182 of Nishimori et al. ("Nishimori") in view of U.S. Patent No. 5,784,031 of Weiss et al. ("Weiss"). The Office Action took the position that Nishimori teaches all of the elements of independent claims 1, 25, and 44 except "disconnecting at least one antenna branch." The Office Action supplied Weiss to remedy the deficiencies of Nishimori. Applicant respectfully traverses this rejection.

Claim 1, upon which claims 2-24 depend, is directed to a method of compensating for a radiation pattern in a radio system. The method includes forming a primary radiation pattern by weighting signals of at least two functional antenna branches of a base station. The method also includes disconnecting at least one antenna branch. The method additionally includes forming a radiation pattern which compensates for the primary radiation pattern by weighting signals of the functional antenna branches.

Claim 25, upon which claims 26-43 depend, is directed to a radio system including a base station for forming a radio interface of the radio system. The base station includes at least two antenna branches for establishing a radio link to terminals. Each antenna branch includes at least one antenna element for forming an antenna array. The base

station includes weighting means for weighting signals of the functional antenna branches for forming a primary radiation pattern. The base station is arranged to disconnect at least one antenna branch. The weighting means are arranged to weight signals of the functional antenna branches to form a radiation pattern which compensates for the primary radiation pattern.

Claim 44, upon which claims 45-62 depend, is directed to a base station of a radio system includes at least two antenna branches for establishing a radio link to terminals, each antenna branch comprising at least one antenna element for forming an antenna array. The base station also includes weighting means for weighting signals of the functional antenna branches for forming a primary radiation pattern. The base station is arranged to disconnect at least one antenna branch. The weighting means are arranged to weight signals of the functional antenna branches to form a radiation pattern which compensates for the primary radiation pattern.

Certain embodiments of the present invention relate to a technique for compensation of a radiation pattern in a radio system. The compensation is obtained by preliminarily forming a primary radiation pattern by weighting signals of at least two functional antenna branches of a base station. Then, at least one antenna branch is disconnected and a radiation pattern is formed which compensates for the primary radiation pattern by weighting signals of the functional antenna branches.

Thus, such embodiments of the present invention can advantageously solve a problem related to interference directed at antenna branches and caused, for example, by

supply electronics, as explained in more detail in the "BACKGROUND" section of the present application.

Applicant respectfully submits that the combination of Nishimori and Weiss does not disclose or suggest all of the elements of any of the presently pending claims, and thus cannot provide that above-described critical and unobvious advantages.

Nishimori generally relates to an adaptive array antenna system. Nishimori's adaptive array antenna system aims to calibrate, automatically, both amplitude and phase of each array antenna element during communication, as explained at column 1, lines 5 to 11. As can be seen from Figure 13 and at column 1, lines 48-53, Nishimori's system includes antenna elements 13-1-1 to 13-1-N, each coupled with transmitters 13-1-1 to 13-1-N or receivers 13-4-1 to 13-4-N through transmit/receive switches 13-2-1 to 13-2-N.

Nishimori, thus, describes a calibration system. However, Nishimori fails to relate the calibration system to compensation of a radiation pattern. Therefore, a person of ordinary skill in the art would not have used teaching of Nishimori in order to solve the problem discussed above. If one of ordinary skill in the art used the teachings of Nishimori, the result would still be restricted to a calibration of an antenna array, not to compensation of a radiation pattern.

The problem cited by Nishimori is the interference from adjacent cell, as can be seen at column 1, lines 28 and 29 of Nishimori. The problem is solved by calibrating an antenna array. Therefore, one of ordinary skill in the art would not have taken Nishimori as an information source for solving the problem described above. Nishimori cannot be

interpreted, either alone or combined with Weiss, as disclosing or suggesting the elements of the presently pending claims. Thus, Nishimori cannot provide the above-described critical and unobvious advantages.

As explained at column 1, lines 54-65 of Nishimori, a receive signal is applied to a receiver through an antenna element and a transmit/receive switch. An output of the receiver is applied to a radiation pattern control calculation circuit 13-7 that calculates amplitude and phase of each channel. A weight multiplier circuit 13-6 multiplies the amplitude and phase to a signal to be transmitted, and the product of the multiplication is applied to antenna elements through transmitters and transmit/receive switches. The amplitude and the phase of the antenna elements are controlled by the weight multiplier circuit so that a desired shape of an antenna beam is obtained.

Further, as can be seen at Figure 12 and column 2, line 64 to column 3, line 13 of Nishimori, the system comprises a reference signal generator 12-11 that sends a signal, which is common to all the branches, to receiver 12-3 through a separator 12-14a. An adjusted value for each receiver is determined based upon a value received in each receiver and a reference value that is a received value by a specific receiver. A transmitter 12-4 sends a signal to a receiver through a switch 12-13 and an attenuator 12-12. The adjusted value is obtained by an output of each receiver, and a reference value of a reference receiver that is defined in the process. Thus, the amplitude and phase of each branch of an antenna array can be adjusted by using only a communication apparatus, according to Nishimori.

However, as the Office Action correctly observes, Nishimori fails to disclose or suggest "disconnecting at least one antenna branch" (as recited by claim 1) and "wherein the base station is arranged to disconnect at least one antenna branch" (as recited by claims 25 and 44). In order to remedy these deficiencies, the Office Action supplied Weiss. Weiss, however, does not remedy these deficiencies.

Weiss generally relates to versatile antenna array for multiple pencil beams and allegedly efficient beam combinations. Weiss, as explained at column 2, lines 9-24, generally discloses a base station including an antenna array that can be used to generate multiple well separated pencil radiation beams. Alternatively, as explained at column 2, lines 25-36, these beams can be combined, without a significant loss, to create a wide angle beam, because non-orthogonal beams may be combined without significant field cancellation. The result is a single antenna array that can be used to transmit or receive different information on different beams at the same frequency or, alternatively, it can be used for transmitting exactly the same information on all beams or on several beams that cover a sector, as explained at column 2, lines 1-8.

As can be seen from Figures 3A, 3B and 4 as well as column 4, line 29 to column 4, line 43 of Weiss, a beam-forming network 308 has 32 inputs 402 and 32 outputs 404. Each output 404 corresponds to an antenna element 202. Each input corresponds to the signal for a beam of a particular multi-element antenna array 108. An example of this can be seen in Figure 1B. The beams closest to the center of the 120 degree radiation

pattern sector developed by a particular multi-element antenna array have their inputs labeled "L1" and "R1," respectively.

Weiss indicates, at column 5, lines 15-27 that, preferably, the inputs for beams "L15," "L16," "R15," and "R16" are left disconnected since these outermost beams would be attenuated. However, Weiss is silent as to disconnecting any antenna branches.

In Weiss, inputs for beams "L15", "L16", "R15", and "R16" are left disconnected since these outermost beams would be attenuated. Moreover, Weiss fails to disclose the primary radiation pattern be compensated by weighting signals of the functional antenna branches. In Weiss, the non-connection of the inputs for the specific beams is aimed at reducing the attenuation of the outermost beams. Indeed, the problem cited by Weiss is to segregate groups of user stations in the spatial domain. The problem is solved by applying 180 degree phase shift for every other beam in a radiation pattern, as explained at column 8, lines 36-52 of Weiss. In certain embodiments of the present invention, in contrast, the disconnected antenna branches can be selected on a random basis based, for example on the interference in the supply electronics of the antenna branches, which interference is not thought to be a deterministic occurrence. As a result, the solution of Weiss would not solve the problem cited in the present application and, thus, cannot achieve the above-identified critical and unobvious advantages. Instead, Weiss would aggravate the situation, since the antenna capacity would not fully be used.

If one of ordinary skill in the art were to combine Nishimori and Weiss (not admitted), the result would be a calibration system that utilized a beam-forming array of

Weiss with specific unconnected antenna signals. The combination would, thus, be different from that defined by the claims of the present application, because there is no intentional compensation of the radiation pattern that was obtained before a disconnection of any specific antenna signals.

Indeed, Weiss does not specifically teach "disconnecting" at least one antenna branch, but only that the inputs for several particular beams are "left disconnected." Leaving something disconnected is different from disconnecting something. That this is a significant difference becomes clear when "compensating" is properly understood. If a primary radiation pattern is to be compensated for after the disconnection of at least one antenna branch, that branch cannot simply be "left disconnected" there must actually be "disconnecting" that occurs. Accordingly, it is respectfully submitted that Weiss does not and cannot remedy the deficiencies of Nishimori by teaching "disconnecting at least one antenna branch" (as recited by claim 1) and "wherein the base station is arranged to disconnect at least one antenna branch" (as recited by claims 25 and 44).

Claims 2-24, 26-43, and 45-62 depend from claims 1, 25, and 44, respectively, and recite additional limitations. Therefore, it is respectfully submitted that each of claims 2-24, 26-43, and 45-62 recites subject matter that is neither disclosed nor suggested in the combination of cited references. Thus, it is respectfully requested that the rejection of claims 1-62 be withdrawn.

For the reasons explained above, it is respectfully submitted that each of claims 1-62 recites subject matter that is neither disclosed nor suggested in the cited references.

Therefore, it is respectfully requested that all of claims 1-62 be allowed, and that this application be passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,

Peter Flanagan
Registration No. 58,178

Customer No. 32294
SQUIRE, SANDERS & DEMPSEY LLP
14TH Floor
8000 Towers Crescent Drive
Tysons Corner, Virginia 22182-2700
Telephone: 703-720-7800
Fax: 703-720-7802

PCF:kmp